

CLAIMS

What is claimed is:

1. An apparatus for cleaning a surface within a vessel having a vessel wall separating a vessel exterior from a vessel interior and having a wall aperture, the apparatus comprising:
 - a source of fuel and oxidizer;
 - an igniter for initiating a reaction of the fuel and oxidizer; and
 - an elongate conduit having a first end and a second end and positioned to direct a gas flow of the reacted or reacting fuel and oxidizer through the wall aperture and discharge from the second end and comprising a plurality of segments secured end-to-end.
2. The apparatus of claim 1 wherein:
 - at least three of the conduit segments have lengths along a gas flowpath 1-3m and characteristic internal cross-sectional areas of 0.006-0.3m².
3. The apparatus of claim 1 wherein:
 - at least three of the segments each comprise:
 - a tubular body having first and second ends; and
 - first and second attachment flanges proximate the first and second ends, respectively.
4. The apparatus of claim 1 wherein:
 - a nozzle assembly extends at least partially through the vessel wall.
5. The apparatus of claim 1 wherein:
 - at least one of the segments is an elbow.
6. The apparatus of claim 1 wherein the conduit consists essentially of three portions:
 - an essentially straight first portion;
 - an essentially straight second portion upstream of the first portion; and
 - a third non-straight portion between the first and second portions.
7. The apparatus of claim 6 wherein:
 - the second and third portions have essentially similar internal cross-sections; and

the first portion includes:

a downstream portion having an internal cross-section essentially similar to the internal cross-sections of the second and third portions;

an upstream portion having an internal cross-section smaller than the internal cross-section of the downstream portion; and

a transition portion having an internal cross-section that transitions from essentially similar to the internal cross-section of the upstream portion to essentially similar to the internal cross-section of the downstream portion.

8. The apparatus of claim 6 wherein the first and second portions are parallel and offset.
9. The apparatus of claim 6 wherein the first and second portions are oriented at an angle of 20°-160° to each other.
10. A method for configuring a detonative cleaning apparatus for cleaning surfaces within a vessel, the vessel having a wall, the method comprising:
 - determining a suitable cross-sectional area for a combustion conduit of the apparatus;
 - determining a suitable length for the combustion conduit;
 - determining an appropriate path for the combustion conduit in view of environmental considerations; and
 - determining an appropriate combination of combustion conduit segments for forming the combustion conduit so as to be routed along the appropriate path.
11. The method of claim 10 wherein:
 - the combustion conduit segments are selected from a plurality of pre-established conduit segment configurations.
12. The method of claim 10 wherein:
 - the combustion conduit segments include at least one straight segment and at least one curved segment.
13. The method of claim 10 wherein:
 - at least some of the combustion conduit segments each comprise:
 - a tubular body having first and second ends; and

first and second attachment flanges proximate the first and second ends, respectively.

14. The method of claim 10 further comprising:
determining an appropriate predetonator configuration.
15. The method of claim 10 in combination with:
generating drawings of the so-configured detonative cleaning apparatus; and
assembling the so-configured detonative cleaning apparatus.